6. The apparatus according to claim 1. further comprising inputting means for manually designating a change of power from said first power to said second power.

7. The apparatus according to claim 1. wherein said changing means includes means for returning power of said ultrasound to said first power after the scanning is continued for a predetermined period of time by said second power.

8. The apparatus according to claim 1. wherein said image data obtaining means includes means for subtracting image data. first obtained after said power of the ultrasound is changed from said first power to said second power, and image data. nth obtained after said power of the ultrasound is changed from said first power to said second power. from each other between frames.

9. The apparatus according to claim 1. wherein said scanning means scans plural ultrasonic scanning lines and includes means for repeating a receiving and transmitting operation twice in connection with each of said ultrasonic scanning lines. and means for subtracting the echo signal obtained by the first receiving and transmitting operation and the echo signal obtained by the second receiving and transmitting operation from each other. and said image data obtaining means obtains image data based on said subtracted echo signal.

10. The apparatus according to claim 1. wherein said scanning means includes means for extracting a high frequency component from said echo signal. and said image data obtaining means obtains image data based on said high frequency component.

11. The apparatus according to claim 1. wherein said displaying means includes means for displaying a power state of said ultrasound.

12. The apparatus according to claim 1. wherein said image obtaining means includes means for obtaining a time density curve of a pixel value of said image data.

13. The apparatus according to claim 1. wherein said scanning means includes first means for generating the ultrasound by said first power. and second means for generating the ultrasound by said second power.

14. An ultrasound diagnostic apparatus comprising:

scanning means for repeatedly scanning a cross section of an examining human body having implanted bubbles as an ultrasonic shadowing agent with an ultrasound to repeat an echo signal;

image obtaining means for repeatedly obtaining image data based on said echo signal;

displaying means for displaying said generated image data as a motion image;

changing means for changing a frequency of said ultrasound from a first frequency to a second frequency; and

storing means for selectively storing the image data obtained from the obtaining means during a time period in which the cross section of the examining human being is scanned with the ultrasound of the second frequency.

15. The apparatus according to claim 14. wherein said image obtaining means includes means for storing image data first obtained after said frequency of the ultrasound is changed from said first frequency to said second frequency.

16. The apparatus according to claim 14. wherein said displaying means includes means for displaying image data first obtained after said frequency of the ultrasound is changed from said first frequency to said second frequency as a static image.

17. The apparatus according to claim 14. further comprising inputting means for manually designating a change of the frequency from said first frequency to said second frequency.

18. The apparatus according to claim 14, wherein said changing means includes means for returning the frequency of said ultrasound to said first frequency after the scanning is continued for a predetermined period of time by said second frequency.

19. The apparatus according to claim 14, wherein said image obtaining means includes means for subtracting image data, first obtained after said frequency of the ultrasound is changed from said first frequency to said second frequency, and image data, subsequently obtained after said frequency of the ultrasound is changed from said first frequency to said second frequency, from each other between frames.

20. The apparatus according to claim 14, wherein said scanning means scans plural ultrasonic scanning lines and includes means for repeating a receiving and transmitting operation twice in connection with each of said ultrasonic scanning lines, and means for subtracting the echo signal obtained by the first receiving and transmitting operation and the echo signal obtained by the second receiving and transmitting operation from each other, and said image generating means generates image data based on said subtracted echo signal.

21. The apparatus according to claim 14, wherein said scanning means includes means for extracting a high frequency component from said echo signal, and said image data obtaining means obtains image data based on said high frequency component.

22. The apparatus according to claim 14, wherein said displaying means includes means for displaying a frequency state of said ultrasound.

23. The apparatus according to claim 14, wherein said image obtaining means includes means for obtaining a time density curve of a pixel value of said image data.

24. An ultrasound imaging method, which repeatedly scans a cross section of an examining human body having implanted bubbles as an ultrasonic shadowing agent with an ultrasound to obtain an echo signal, repeatedly obtains

image data based on said echo signal, and displays said image data as a motion image, comprising:

a first step of scanning said ultrasound by first power;

a second step of scanning said ultrasound by second power stronger than said first power after scanning said ultrasound by said first power; and

a third step of selectively storing the image data obtained during a time period in which the cross section of the examining human body is scanned with the ultrasound of the second power.

25. The method according to claim **24**, wherein said power is sound pressure.

26. The method according to claim **25**, further comprising a third step of returning power of said ultrasound to said first power after the scanning is continued for a predetermined period of time by said second power.

27. An ultrasound imaging method, which repeatedly scans a cross section of an examining human body having implanted bubbles as an ultrasonic shadowing agent with an ultrasound to obtain an echo signal, repeatedly obtains image data based on said echo signal, and displays said image data as a motion image, comprising:

a first step of scanning said ultrasound by first power;

a second step of scanning said ultrasound by second power stronger than said first power after scanning said ultrasound by said first power; and

a third step of selectively storing the image data obtained during a time period in which the cross section of the examining human body is scanned with the ultrasound of the second frequency.

28. The method according to claim **27**, further comprising a third step of returning the frequency of said ultrasound to said first frequency after the scanning is continued for a predetermined period of time by said second frequency.

* * * * *

29. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit ultrasound to a human body having implanted bubbles and to receive an echo signal corresponding to an ultrasound echo from the human body;

a transmission mechanism configured to apply a first drive signal and then a second drive signal successively to said transducer, said first drive signal having a first characteristic resulting in said transducer generating a respective first echo signal representative of a first quality image and said second drive signal having a second characteristic resulting in said transducer generating a respective second echo signal representative of a second quality image higher than the first quality; and

a processor configured to generate first and second display image data corresponding to said first and second quality images.

30. The apparatus of Claim 29, wherein said transmission mechanism is configured to apply said first and second drive signals to said transducer during respective first and second time periods and comprises a selection mechanism configured to variably select at least one of said first and second time periods.

31. The apparatus of Claim 29, wherein said transmission mechanism is configured to apply first drive signals having a first power level and second drive signals having a second power level greater than said first power level.

32. The apparatus of Claim 29, wherein said transmission mechanism is configured to apply first drive signals having a first frequency and second drive signals having a second frequency different from said first frequency.

33. The apparatus of Claim 29, wherein said transmission mechanism is configured to apply first drive signals having a first pulse repetition rate and second drive signals having a

second pulse repetition rate greater than said first pulse repetition rate.

34. The apparatus of Claim 30, wherein said transmission mechanism comprises a user interface by which a user can manually variably select duration of at least one of said first and second time periods.

35. The apparatus of Claim 34, wherein said transmission mechanism is configured to apply first drive signals having a first power level and second drive signals having a second power level greater than said first power level.

36. The apparatus of Claim 34, wherein said transmission mechanism is configured to apply first drive signals having a first frequency and second drive signals having a second frequency different form said first frequency.

37. The apparatus of Claim 34, wherein said transmission mechanism is configured to apply first drive signals having a first pulse repetition rate and second drive signals having a second pulse repetition rate greater than said first pulse repetition rate.

38. The apparatus of Claim 29, wherein said processor comprises a high pass filter which extracts high frequency components from the second echo signals and is configured to generate said second display image data based on the high frequency components extracted by said filter.

39. The apparatus any one of Claims 29-38, wherein said transmit mechanism comprises a user interface by which an operator can manually initiate application of said second drive signal.

40. The apparatus of any one of Claims 29-38, wherein said transmit mechanism comprises a trigger input configured to receive an electrocardiographic signal and generate said second drive signal in response to said electrocardiographic signal.

41. An ultrasound diagnostic apparatus for examining a region of a human body having an implanted bubbles, comprising:

a transducer configured to transmit an ultrasound signal to said region of said human body in response to a first drive signal and to generate an echo signal in response to an ultrasound echo from said region of said human body;

a transmit driver coupled to the transducer and configured to apply to said transducer during a first variable time interval in which implanted bubbles flow into said region of said human body a series of drive pulses as said first drive signal, said drive pulses causing said transducer to transmit the ultrasound signal with a power level sufficient to break at least some but substantially less than all of the bubbles in said region of said human body; and

a processor coupled to said transducer and configured to generate display image data based on echo signals produced by said transducer in response to application of said series of said first drive signals to said transducer.

42. The ultrasonic diagnostic apparatus according to claim 41, wherein said transmit driver is configured to apply said series of first drive signals so that the transducer produces corresponding first ultrasound signals at a first power level during said first variable time interval and to apply to said transducer a second series of drive signals so that the transducer produces corresponding second ultrasound signals at a second power level during a second variable time interval after said first time interval to break bubbles in said region of said human body during said second variable time interval.

43. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive pulse an ultrasound signal to a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body;

a transmission mechanism configured to apply to said transducer a series of first drive pulses to cause said transducer to transmit ultrasound signals to break the bubbles during a first time period and to stop the transmitting of the drive pulses breaking the bubbles during a subsequent variable time period; and

a processor configured to generate data of plural images based on echo signals generated by said transducer during the first time period.

44. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive pulse an ultrasound signal to a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body;

a transmission mechanism configured to apply to said transducer repeatedly a series of first drive pulses to cause said transducer to transmit corresponding ultrasound signals to break the bubbles, wherein the first drive pulses transmission is started by a trigger signal and ended a first time period after the trigger signal;

a processor configured to generate data of plural images based on echo signals generated by said transducer in response to the series of said first drive pulses.

45. The apparatus according to claim 43, wherein said processor is configured to generate data corresponding to motion display images based on echo signals generated in response to a series of second drive pulses applied during the variable time period.

46. The apparatus according to claim 43, wherein said processor comprises a subtraction mechanism configured to generate a subtraction image by subtracting between said plural images.

47. The apparatus according to claim 43, wherein said processor comprises a filter configured to extract high frequency components from the echo signals and to generate said image

data based on the extracted high frequency components.

48. The apparatus according to claim 43, wherein said processor comprises a memory configured to store storing the image data.

49. The apparatus according to claim 43, wherein said processor is configured to generate static display image based on image data obtained during the first time period.

50. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive signal an ultrasound signal to a region of a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body; and

a transmit driver coupled to the transducer and configured to apply to said transducer a sequence of said drive signals having a sufficiently low first power during a first time period so that said transducer transmits said ultrasound signal at a first power level during said first time period to allow a substantial number of bubbles to remain in said region of said human body during said first time period and a second power during a second time period so that during said second time period said transducer transmits said ultrasound signal at a second power level to break substantially all the bubbles in said region of said human.

51. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive pulse an ultrasound signal to a region of a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body; and

a transmission mechanism configured to apply to the transducer plural drive pulses at a first power followed by plural drive pulses of a second power greater than said first power; and

a processor configured to generate time density curve data corresponding to time variation of luminance value of at least one image pixel based on echo signals generated by said transducer during application of said plural drive signals of said first power and said second power.

52. The apparatus according to claim 51, wherein said processor includes a filter configured to extract high frequency components from the echo signals and to generate image data based on the extracted high frequency components.

53. The apparatus of claim 10, wherein said high frequency component includes at least a harmonic greater than a first harmonic of a frequency of the ultrasound signal.

54. An ultrasonic diagnostic apparatus comprising:

an ultrasound probe configured to generate an ultrasound signal for application to a region of a human body having implanted bubbles therein in response to a drive signal and to generate an echo signal in response to reflection of said ultrasound signal by said human body;

a drive signal generator coupled to the probe and configured to generate and apply to the probe the drive signal, said drive signal having a selected power which is changeable between a first power and a second power greater than said first power;

an image processor coupled to said probe to generate image data based on echo signals generated by said probe in response to reflections of ultrasound signals generated by said drive signal in correspondence with the drive signal having said first and second powers, said image processor comprising a memory configured to store the image data generated in relation to ultrasound signals generated when said drive signal has said second power; and

a display coupled to the image processor and configured to display a motion image corresponding to the generated image data.

55. An ultrasound probe configured to generate an ultrasound for application to a region of a human body having implanted bubbles therein in response to a drive signal and to repeatedly scan said region to detect an echo signal;

an image processor coupled to said probe and configured to generate image data in response to said detected echo signal;

a display coupled to the image processor and configured to display the generated image data as a motion image;

a driver coupled to the probe and configured to apply the drive signal to the probe;

a frequency selector coupled to the driver for providing a frequency select signal to change the frequency of the drive signal from a first frequency to a second frequency; and

a memory coupled to the image processor selectively storing the image data during a time period in which the cross section of the examining human being is scanned with the ultrasound generated upon application to the probe of the drive signal having the second frequency.

56. An ultrasound diagnostic apparatus comprising

a transducer transmitting in response to a drive signal an ultrasound to a region of a human body having implanted bubbles, and generating an echo signal corresponding to an ultrasound echo from the human body

a transmission mechanism configured to apply first and second drive signals to the transducer to cause said ultrasound to break the bubbles in said region of said human body, said first drive signal comprising plural pulses applied for a scanning line and said second drive signal comprising a pulse applied for same line after applying the first drive signal, said transmission mechanism repeating application of said first and second drive signals for each of plural scanning lines;

a processor comprising a subtraction mechanism configured to perform subtraction between a first echo signal produced upon application of said first drive signal and a second

echo signal produced upon application of said second drive signal, said processor configured to generate display image data based on a result of the subtraction.

✓ 57. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit ultrasound to a region of a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body;

a transmission mechanism configured to apply to the transducer first and second drive signals to produce first and second ultrasound echo signals from the human body, said first drive signal having a first characteristic which results in echo reflected off bubbles and tissue and breaking of the bubbles in the region and the second drive signal having a characteristic which results in echo reflected off substantially only tissue in said region; and

a processor having a subtraction mechanism, a synchronism mechanism configured to apply the first and second echo signals in synchronism to said subtraction mechanism and an image processor configured to generate display image data based on the result of the subtraction performed by the subtraction mechanism, said subtraction mechanism configured to perform subtraction between the first and second echo signals .

58. The apparatus according to claim 57, wherein said processor comprises:

the synchronism mechanism having a delay mechanism configured to delay the echo signals outputted from the probe, and a detecting mechanism configured to detect a result of subtraction by the subtraction mechanism.

59. The apparatus according to claim 57, wherein said processor comprises:

a receiving delay mechanism providing delay time for the echo signals outputted from the probe, the synchronism mechanism having a delay

mechanism configured to delay the echo signals outputted from the receiving delay mechanism, the subtraction mechanism configured to perform subtraction between the echo signals outputted from the receiving delay mechanism and from the delay mechanism, an adder mechanism adding the subtracted echo signals, and a detecting mechanism detecting the added echo signals.

60. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit ultrasound to a human body having implanted bubbles, and to generating an echo signal corresponding to an ultrasound echo from the human body;

means for applying a first drive signal and then a second drive signal successively to said transducer, said first drive signal resulting in said transducer generating a respective first echo signal representative of a first quality image and said second drive signal resulting in said transducer generating a respective second echo signal representative of a second quality image higher that the first quality; and

a processor configured to generate first and second display image data corresponding to said first and second quality images.

61. An ultrasound diagnostic apparatus for examining a region of a human body having an implanted bubbles, comprising:

a transducer configured to transmit an ultrasound signal to said region of said human body in response to a first drive signal and to generate an echo signal in response to an ultrasound echo from said region of said human body;

means for applying to said transducer a series of pulses as said first drive signal during a first variable time interval in which implanted bubbles flow into said region of said human body, said drive pulses causing said transducer to transmit the ultrasound signal with a power level sufficient to break at least some but substantially

less than all of the bubbles in said region of said human body; and

a processor coupled to said transducer and configured to generate display image data based on echo signals produced by said transducer in response to application of said series of said first drive signals to said transducer.

62. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive pulse an ultrasound signal to a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body;

means for applying to said transducer a series of drive pulses to cause said transducer to transmit ultrasound signals to break the bubbles during a first time period and to stop the applying of the drive pulses breaking the bubbles during a subsequent variable time period; and

a processor configured to generate data of plural images based on echo signals generated by said transducer during the first time period.

63. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive pulse an ultrasound signal to a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body;

means for repeatedly applying to said transducer a series of first drive pulses to cause said transducer to transmit corresponding ultrasound signals to break the bubbles, wherein the first drive pulses transmission is started by a trigger signal and ended a first time period after the trigger signal; and

a processor configured to generate data of plural images based on echo signals generated by said transducer in response to the series of said first drive pulses.

64. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive signal an ultrasound signal to a region of a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body; and

means for applying to said transducer a sequence of said drive signals having a sufficiently low first power during a first time period so that said transducer transmits said ultrasound signal at a first power level during said first time period to allow a substantial number of bubbles to remain in said region of said human body during said first time period and a second power during a second time period so that during said second time period said transducer transmits said ultrasound signal at a second power level to break substantially all the bubbles in said region of said human.

65. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit in response to a drive pulse an ultrasound signal to a region of a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body; and

means for applying to the transducer plural drive pulses at a first power followed by plural drive pulses of a second power greater than said first power; and

a processor configured to generate time density curve data corresponding to time variation of luminance value of at least one image pixel based on echo signals generated by said transducer during application of said plural drive signals at said first power and said second power.

66. An ultrasonic diagnostic apparatus comprising:

an ultrasound probe configured to generate an ultrasound signal for application to a region of a human body having implanted bubbles therein in response to a drive signal and to generate an echo signal in response to reflection of said ultrasound signal by said human body;

means for applying the drive signal to the probe, said drive signal having a selected power which is changeable between a first power and a second power greater than said first power;

an image processor coupled to said probe to generate image data based on echo signals generated by said probe in response to reflections of ultrasound signals generated by said drive signal in correspondence with the drive signal having said first and second powers, said image processor comprising a memory configured to store the image data generated in relation to ultrasound signals generated when said drive signal has said second power; and

a display coupled to the image processor and configured to display a motion image corresponding to the generated image data.

67. An ultrasound diagnostic apparatus comprising

a transducer transmitting in response to a drive signal an ultrasound to a region of a human body having implanted bubbles, and generating an echo signal corresponding to an ultrasound echo from the human body

means for applying first and second drive signals to the transducer to cause said ultrasound to break the bubbles in said region of said human body, said first drive signal comprising plural pulses applied for a scanning line and said second drive signal comprising a pulse applied for the same line after applying the first drive signal, said transmission mechanism repeating application of said first and second drive signals for each of plural scanning lines;

a processor comprising a subtraction mechanism configured to perform subtraction between a first echo signal produced upon application of said first drive signal and second echo signal produced upon application of said second drive signal, said processor configured to generate display image data based on a result of the subtraction.

68. An ultrasound diagnostic apparatus comprising:

a transducer configured to transmit ultrasound to a region of a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body;

means for applying to the transducer first and second drive signals to produce first and second ultrasound echo signals from the human body, said first drive signal having a first characteristic which results in echo reflected off bubbles and tissue and breaking of the bubbles in the region and the second drive signal having a characteristic which results in echo reflected off substantially only tissue in said region; and

a processor having a subtraction mechanism and configured to apply the first and second echo signals in synchronism to said subtraction mechanism, said subtraction mechanism configured to perform subtraction between the first and second echo signals, said processor configured to generate display image data based on the result of the subtraction performed by the subtraction mechanism.

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